

Barbary ground squirrels look for predators together as a survival strategy

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UC behavioral ecologist Annemarie van der Marel spent three years studying Barbary ground squirrels in the Canary Islands. Credit: University of Cincinnati/Provided

Ground squirrels have few natural defenses against predators, so they rely on an early warning system to identify threats and alert others to run for cover.

But unlike meerkats that take individual turns standing watch while the rest forage, ground squirrels found off the coast of Africa keep watch together—a behavior called synchronous vigilance, according to a new study by the University of Cincinnati.

The study was published in the journal *Behavioral Ecology and Sociobiology*.

Lead author Annemarie van der Marel, a postdoctoral researcher in UC's College of Arts and Sciences, spent three winters studying Barbary ground squirrels, an invasive species introduced to the Canary Islands from Morocco on Africa's mainland. The almond-eyed, striped rodents with bushy tails live in colonies and take shelter underground in a network of burrows like other ground squirrels.

"They're pretty cute. People had them as pets and that's how they were introduced to the Canary Islands in 1965," she said.

"I looked at whether and why they were social. I began studying the strategies for how they evade predation and increase survival. That's how I got to the question of the synchronous vigilance of the species," she said.

Prey animals such as kangaroos and wild boar also use synchronous vigilance to stay safe, van der Marel said.

Co-author Marta López Darias, a researcher with the Institute of Natural Products and Agrobiology in Spain, said the synchronized behavior increases with the size of the group. Similar observations have been

made with other species that employ this defensive strategy.

Unusual for ground squirrels, the populations found in the Canary Islands are as comfortable in the trees as on the ground, she said. They seem to prefer high vantage points such as the old rock walls above the fields and ravines where they can scan all angles of their surroundings. On the Canary Islands' Fuerteventura, the squirrels face daily threats from domestic cats and birds of prey like buzzards and common kestrels.

"When they forage, they're most vulnerable," van der Marel said. "So the squirrels have to balance the time spent foraging and being vigilant. Their main defense mechanism is being watchful and alerting other group members to escape predation."

To find food, the squirrels set out daily from their underground dens to forage for roots, seeds and fruit. Active in the day, they rely on their keen vision to detect threats from the air and land. The alarm call of a nearby squirrel will alert others and may send some running for the safety of rock piles or the nearest burrow. Often, other squirrels will join in the watchful vigil.

The animals can't look for food and be on high alert for predators at the same time. So throughout the day they stop what they're doing to scan the environment together, often from a higher vantage point, van der Marel said.

Virtually all the squirrels spend time standing watch during the day. About one-third of the time, they do so alone. But 40% of the time, they have company. And when a predator is observed, multiple squirrels stop to stand watch 60% of the time, the study found.

Researchers found that squirrels that spent more time watching still found enough food to remain in good physical condition. Likewise, their

extended vigilance did not affect their overall survival rates.

Fuerteventura has fewer predators than the mainland, while the rock walls the squirrels used as a lookout post were close to cover, allowing for a hasty retreat.

Unlike many North American ground squirrels that hibernate during the freezing winter, Barbary [ground squirrels](#) remain active throughout the year. As a result, they don't have the same physiological demands to fatten up for hibernation.

Standing watch carries an inherent cost since it presumably takes time away from foraging. López Darias said the behavior might be more pronounced in healthy, fit animals that can afford to devote time to vigilance.

"It may be that the squirrels don't have to forage as much as there are plentiful resources and less predation pressure," van der Marel said.

So when they're not eating, the squirrels often relax or stand vigil on their high rocky perches.

Van der Marel said other squirrel behaviors are likewise synchronized.

"They're waking up at the same time, foraging at the same time. They get satiated at the same time," she said. "They perform synchronously when there are predators and when there aren't predators around. They watch each other's back."

Van der Marel said the question is why the squirrels stand watch together. It seems counterintuitive when others are already serving as a sentinel.

Did they simply finish foraging at the same [time](#)? Or were they copying

another squirrel's behavior? That would be advantageous since they would find cover before non-vigilant squirrels.

Or was this synchronous behavior an adaptation tied to their environment, a place where the surroundings and rock walls offer too many hiding spots for ambush predators for a single [squirrel](#) to observe?

At UC, van der Marel is studying another invasive and highly social species, monk parakeets. Both species are adapting to new environments.

"I'd like to combine those two areas in my research and study the resilience of [invasive species](#) to their novel environments," she said.

More information: Annemarie van der Marel et al, Barbary ground squirrels do not have a sentinel system but instead synchronize vigilance, *Behavioral Ecology and Sociobiology* (2021). [DOI: 10.1007/s00265-021-03094-1](#)

Provided by University of Cincinnati

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